# THE TENDENCIES OF EXPERIMENTAL PSYCHOLOGY IN ITALY.[1]

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Here in Italy, where the interest in experimentation arose during the brightest period of the Renascence, chiefly with the great Galileo, the experimental study of mental phenomena is assiduously pursued. We have three laboratories of Experimental Psychology: one at Turin, in the Institute of Physiology, directed by Prof. Angelo Mosso; another at Rome, established and directed by the anthropologist, Prof. G. Sergi; a third at Florence in the Institute of Higher Studies (Professional and Training School), of which Prof. Francesco De Sarlo, the eminent psychologist and philosopher, now physician and surgeon in the royal army, is director. I am seizing this present opportunity to give a brief note on the actual state of Experimental Psychology in Italy; reserving for another paper the mention of other tendencies that have able representatives among us,—men like Senator Carlo Cantoni, recently appointed honorary professor in the University of Königsberg, in recognition of his eminence in Kantian studies; or the professors Fillipo Masci, Roberto Ardigò, Francesco Bonatelli, and others. The main purpose of this brief essay is to trace the two currents of psychological thought, now dominant in Italy, which, in a general way, correspond to the schools of Münsterberg[2] and Wundt.

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[1] Translated by Mr. H. C. Stevens, Cornell University.

[2] H. Münsterberg, as is well known, starts out, as does the Wundtian School, from experimental psychophysiology; but he arrives at conclusions different from those of Wundt, in that he reduces all the complexity of mental life to sensations alone. Moreover, in his action theory (Aktionstheorie), he considers the impulse solely in the mechanical aspect of the reflex act, subordinating it, therefore, to physiological laws. In opposition to Wundt who admits the duplicity of causality, with respect to internal and external experience, Münsterberg maintains that psychical causality is not valid; that, for example, the ultimate problem of the psychology of the will consists in determining what excitations of cortical centres are necessary, in order that the sensations which arise in consequence combine in a way to constitute an act of will. But Münsterberg's theory is not founded on positive facts, nor is it sustained by physiology; it is, furthermore, too schematic, and it is contradictory to psychological experience.

I.

The representatives of the first tendency expressly postulate a complete correlation between mental organs and mental functions. Experimental Physiology, they say, has bridged the gulf between the two provinces of fact, although up to the present time it may have explored only a very limited field, in which there is much doubt and uncertainty. But the proof that can be given for other organs and functions is still lacking in the case of the brain and mental phenomena. It is true there have been some innovators in histology who believe that the solution of the psychological mystery is to be found in the cells stained by Golgi's method. In order to gain a vantage ground, they have called the pyramidal cell of the cerebral cortex, "psychical cell" or "cell of volition." They have asserted, further, that this cell synthetizes our conscious activity by expressing it in a voluntary act, for that reason acquiring the highest morphological differentiation. But serious criticism soon showed that they had reinstated an error of the old metaphysics, habited in modern garb. The hypothesis of a "cell of volition," of an "archicell," of a "pontifical cell" was of the same sort as that of the "seat of the soul." The soul, thanks to the advances of physiology, was always shifting from one seat to another: from the pineal gland, which is known to be an atrophied centre of vision, from the ventricles of the brain, from the centrum ovale, from the corpus callosum. So that, if the hypothesis of one seat were still tenable, the soul would have to be lodged in all the psychical centres, and even in the whole of the cerebrospinal nervous system. The same school declares that if it were true that physiological psychology presupposes the theory of a nerve motion, which has been named neurokyme, it must be admitted that the nature of this nerve motion is wrapped in profound obscurity; but that even if the physiology of the central nervous system had got beyond the tentative stage, and if the theory of neurokyme had been developed as far as the physics of vibrations, and if, further, mechanical formulæ had been derived, representing the masses, velocities and positions of all the cerebral elements of a given moment, still, one would merely know how the energy of the stimuli had been transformed into an organic molecular motion by means of the potential energy accumulated in various organs of the nervous system; but in this physical process there would still be no trace of a mental process. Accordingly, several authors concern themselves with the mode of behavior of the nerve cell and of the cells of the sense organ under different conditions of activity and repose. It seems, moreover, that marked changes, in both the nucleus and protoplasm, have been

brought to light. There are, too, some workers who attempt to demonstrate minute changes in the cells, in different pathological conditions of the nervous system. But all of these studies offer only promises, beneath which one seems to hear the whisper of something like the hope which always flourishes where science flourishes,—though in reality the attempt is fallacious—the hope of founding all the phenomena of life on these chemical and physical phenomena, of pervading physiology through and through with chemistry and physics. In the actual state of the science, the features common both to the nervous system and to consciousness are enumerated by Höffding.[1] 1. The nervous system serves as the central organ of co-ordination for the different parts of the organism; consciousness unites what is separate in space and time. 2. Change and process are alike conditions for the functioning of the nervous system and for the activity of consciousness. 3. The stimulus does not excite one centre only; but by means of the manifold branchings of the nervous system, it evokes a series of excitations in centres connected with that first affected. In the same way, the effect of a sensation is extremely complex, since it has the power to recall a great number of ideas. 4. The reaction time, or physiological time, stands in direct proportion to the complexity of the mental operations. 5. Corresponding to the opposition between the active and passive aspects of thought, there are the sense organs and afferent nerves on the one hand, and the nerve centres and efferent nerves on the other. But except for these conclusions, showing the attempts of those who would make psychology "the physics of human thought," no physiologist on the basis of all the wonderful advances of his science would be able to deny that there is a gulf between the molecular state of the brain corresponding to a thought and the thought itself. Supposing for a moment, at least, that physiological psychology had achieved such progress as to be able to express with mathematical precision, the velocity, direction, composition and reaction of molecular motions, for every volition, emotion and thought, still, however much faith one has in science, the physiological series, for thought, would simply be a system of signs analogous to those of language. Unless, indeed, by starting out from an *a priori* proposition, with the method that has been so much condemned in Scholasticism, our psychologists mean to deduce a *speculative* doctrine of the relations between the matter of the brain and the manifold manifestations of the mental life, not content with the pure and simple conclusion to which all the analyses and all the research of contemporary science have come. At the same time, apart from

[1] Psychology, pp. 62-66.

this prejudice which tends to reduce the spiritual entity to a mechanical law, as though man were no more than a mass of muscles and nerves, irrigated by blood, important researches have been accomplished in this field of psychology, which with strictness of terms may be called physiological psychology. Angelo Mosso, especially, may be mentioned in this connection as a profound observer and investigator. Playing upon the human organism, by his varied physiological appliances, as a musician plays upon his instrument, he seeks to determine by experimental means the organic states and functions which underlie and explain the psychical phenomena revealed to his introspective intuition.

II.

De Sarlo[1] is the representative of the second tendency. He admits that Psychology as a positive science must be taught by the method of positive sciences. A science of fact, he says, can be taught only by means of the demonstration of these facts; and the means of demonstration are observation and experiment. To teach psychology to-day, without some means of demonstration, would be as absurd as on the other hand to found a laboratory of philosophy. And a laboratory of psychology, thanks to De Sarlo's own energetic initiative and to the co-operation of Pasquale Villari and of Felice Eocco, has been recently established in the Royal Institute of Higher Studies.

We hope that a similar change will be made presently, in the other philosophical faculties of the kingdom.

Now the direction which De Sarlo is trying to give to the study of psychology is new, original and, in my opinion, right; it deserves, therefore, a brief note.

Before all, De Sarlo believes that there can be no psychology which is not animated by the principle that "a real subject exists." It is not the business of the psychologist to examine the nature of such a subject, much less, to find a place for it in the system of cognitions, by proceeding from philosophical premises. It belongs to philosophy, and, properly speaking, to epistemology (in this point, he agrees with Wundt and Titchener), to criticise this concept, which may even be false but which is, nevertheless, indispensable to psychology, just as certain prin-

[1] *Cf.* especially, the following parts of the works of De Sarlo. 1. *Experimental Psychology in Germany*, the most important paper, which was published in the Rivista Sperimentale di Freniatria, Vol. XIX, fasc. I; 2. *The Object of Physiological Psychology*, in the Essays in Philosophy, published by Clausen in Turin in 1896; 3. *The Concept of Mind in Contemporary Psychology*, read March 1, 1900, before the Royal Institute of Higher Studies of Florence; published by E. Ducci, Florence; 4. *The Data of Mental Experience*, the latest publication of the Royal Institute of Higher Studies.

ciples are necessary to many other sciences, the atom to chemistry, motion to mechanics, etc., and without them analysis could not be made. An organism can come only from an organism; and, furthermore, even in physiological life, there is something that cannot be reduced to chemical and mechanical principles alone. The evolution of the germ cell shows how an organism requires the postulate of *life* in order to be understood from the physiological point of view: notwithstanding the fact that this postulate is excluded from modern science, on the ground that it would be a vital force detached from the organism. Similarly the concept of mind, understood as a real and active subject, is the postulate of every psychological discussion. It stands for the content of mental life, which has its own principle in itself, in so far as it is something spontaneous and individual. The germ cell is not merely a chemical compound, but it is the potentiality of life; this law holds as much for psychology as for biology. As in the circumference of a circle, every arc exemplifies the law and necessarily presupposes it, so every phenomenon of consciousness, in order to be understood, must be referred to the individual subject of which it is only an expression.[1]

But what is Psychology according to De Sarlo? He gives the following definition of it. "It is that science which has for its object the study of the arousal and course of that particular category of facts or processes which is called psychical." This category is chiefly distinguished from all others by its character of incommunicability. The mental facts are individual; they cannot be transferred to another person. They are something more than that: but when they are studied from the psychological standpoint, they must be considered in abstraction from all the rest of reality, as necessarily referring to an empirical subject,—not the subject with which epistemology has to do, but an organic individual who occupies a determinate position in space and time. It is true that we communicate our thoughts, our ideas and our feelings, etc.,—but we do not communicate directly: rather indirectly, by means of written and spoken words and gestures. "It is impossible to read directly the consciousness of another individual and to feel precisely as he feels at any given moment." At this point, one may raise the question whether this method of viewing the facts of mind, according to De Sarlo, is right. We believe that it is, and we will briefly give our reasons. In order to express our ideas, we are constrained to make use of words; our thought thus assumes a spatial form. That is, the spatial

[1] *Cf.* the admirable lecture, *The Concept of Mind in Contemporary Psychology*, delivered before the Institute of Higher Studies. Florence, 1900, E. Ducci.

distinctions which language forces us to impose on ideas are as sharp and precise as those we impose on physical objects. Now this tendency of ours, to translate non spatial phenomena into spatial terms, thus mutation of quality into quantity, is the cause of all the perplexities arising from certain psychological problems. Indeed, if there exists a contradiction in the formulation of the problem, it is natural that a contradiction, likewise, should be found in the solution. In fact, in the superficial stratum of consciousness which reflects the images of the external world, the phenomena preserve that discreteness, that isolation, which characterizes their objective correspondents (it is precisely to the simple sensation that the theory of association adapts itself); but in the deeper lying strata, the states of consciousness depend upon and receive their color from all the other states, and therefore every individual loves and hates in his own way, thus revealing his whole personality. Language, overlooking this difference, uses the same word for all individuals. It results, therefore, that only the impersonal elements of emotions are expressed in language. We cannot translate our impressions into words. Language is inadequate to thought. But, as a matter of fact, mental phenomena are not fixed; they vary continually; and, if it seems that they do not change, it is because we do not attend to them, but to their external causes, or, rather, to the names of the objects. Language predisposes us to errors of judgment in the matter of sensations. For example, any one eating a piece of meat which is considered a dainty can be induced to believe that it appears so to him, although it does not. In sum, the word merely expresses what is common to states of consciousness, without taking account of subjective variations. Our emotions, especially, are phenomena that change continually and in which every element receives its color from the combination in which it happens to be. When we analyze an emotion we destroy that which constituted its real and concrete individuality. We have no more than the shadows of ourselves. So that instead of having decomposed into its true components the emotion we set out to analyze, we have split it up into hard impersonal elements to which we give a name and profess to be able to apply logical laws. Thus, consciousness presents a different aspect, according as it is regarded in itself or spatially; just because the fundamental phenomena of mind are qualities that so intermingle that it is impossible to distinguish them or even to ask whether they are one or many. Mental phenomena have a manifold duration which is, as Bergeon would rightly say, a qualitative not a quantitative duration.

Now, if one accepts De Sarlo's way of stating the psychological problem, one avoids all confusion between space and

time, between simultaneity and succession, between quantity and quality. A sensation, a perception, an image, a word thought or even pronounced, a feeling, an impulse, present themselves as facts that have the characteristic of being qualitatively different and irreducible one to another. The connections which we predicate of them are different from and irreducible to one another; the connections, for example, which we posit between a sensation and a feeling are founded solely on experience, on the habit of seeing a sensation associated with a feeling, etc. The field of psychology is thus clearly limited. One may say that it embraces all that we know in the world of qualitative difference. Having defined psychology thus, it would seem that De Sarlo must accept, without change, the opinion of Wundt that psychology has the same subject matter as that of the natural sciences: since, if psychology studies the mental qualities and if all that we know in the world is represented by all these qualitative states, we ought to say that the psychological point of view is co-extensive with the whole realm of reality; thus psychology and the natural sciences would have the same reality as an object, but each would regard it from a different point of view. But, according to De Sarlo, the difference between psychology and the other natural sciences is very much greater than that stated by Wundt, Höffding and Masci. Psychology studies the origin of the various qualities in consciousness, but it does not consider them as constituting external reality; it distinguishes between objects that are conceived to be outside of consciousness, and the qualitative states themselves, that arise in consciousness. By proposing to study mental facts, we are forced to say that there are external objects which, by acting on consciousness, arouse qualitative states; but we do not mean by this, says De Sarlo, to identify mental facts with external reality. That may be demonstrated in epistemology; but from the psychological point of view we are constrained to make a sharp distinction between states of consciousness and external reality, to set the world of mind over against the external world of reality. Progress in psychology is impossible without presupposing some facts outside of consciousness. These external facts are conceived by modern science as simple quantitative variations; all phenomena are reduced to mechanical laws. One may say that every advance in physics means the possibility of reducing a determinate group of phenomena, previously irreducible, to phenomena of mechanics; the vaunted unity of the physical forces consists just in the reduction of every form of energy to particular kinds of motions. Now, De Sarlo points out that when one speaks of quantity, one means a quantity of a given quality; that these qualities for physics are atoms and motion;

but that, inasmuch as quality is uniform through all phenomena, therefore, objectively, it loses its value and the essential matter comes to be the quantitative variations. The psychological problem arises out of the need of explaining the production of mental phenomena, having given the two elements, external reality and the active subject. The task of psychology, therefore, is to see how those qualities are produced, with which we invest the external world; and, especially, the study other mental phenomena (images, memories, etc.) which we do not attribute to external reality. It is not necessary, in fact, that qualitative states should be produced by physiological conditions, in the way that sensation presupposes the action of external stimuli. In that case, we have the external stimulus that arouses the sensation; then this sensation, in turn, is a stimulus that sets up mental facts of a higher order. Just as the ovum, after it is fertilized, at first appears a homogeneous mass of cells which, at length, become differentiated into folds and layers, from which tissues, organs and systems are developed, so the mental life of sensations evolves into still more complex mental qualities. In consciousness, therefore, we see different qualities; we may say, then, that the function of consciousness is to qualify, to translate into quality, that which is presented to it. For example, a visual sensation, given under certain circumstances, forms complexes with muscular and articular sensations, thus arousing other qualities which we interpret as objective, spatial determinations, that is, as something that is not given immediately to consciousness, but, on the contrary, is already outside of consciousness. Now, one who is not acquainted with psychology thinks that the eye immediately perceives spatial relations. Psychology, however, shows that this belief is erroneous. The eyes merely convey to consciousness the local signs, sensory qualities, which have a character of their own, by which they set up complex qualities of a higher order. Therefore, psychology, as a science, comprehends a system of laws which represent the connection between determinate conditions and the arousal of qualitative states.

After making the distinction between psychology and the natural sciences, De Sarlo holds a course remote both from the old metaphysic and from naturalism. He insists that psychical causality is a causality *sui generis;* not merely irreducible to, but totally different from, the causality of natural phenomena.

Psychology, according to De Sarlo, is an abbreviated expression standing for a group of special psychological sciences, which have special characters and which are subject to the limitation of point of view and method in the light of which, and by which, the mental phenomena are studied. The chief psycho-

logical sciences are the following: a. physiological psychology; b. experimental psychology, properly called psychophysics; c. empirical psychology; d. philosophical psychology. Physiological psychology has the following main tasks. First of all, it has to show in what way the relation between the external world and consciousness is established; in other words, it studies the structure and function of the sense organs. It has, further, to show in what way the phenomenon called motion produces effects in our consciousness and how it is that motions and vibrations of the ether are transformed into excitations of nerves, before reaching the central nervous system. It studies especially the general conditions of the activity of the nervous system, in order to show why changes in consciousness are co-ordinated with changes in the body. The nervous system is related to consciousness; therefore, to examine respiratory, chemical and metabolic relations, is to study the activity of the nervous system in relation to mental activity. We have, thus, a method for studying many important mental phenomena, as sleep, waking, health, fatigue, etc. Another problem for physiological psychology is the study of the bodily effects of mental phenomena. For example, we know that emotions have physical effects which, by acting as stimuli, may give rise to new mental facts. The emotion and the bodily response thus constitute a complete circuit which physiological psychology must resolve into its elements. Finally, since we know that the nervous system and mental activity stand in a relation of concomitance, we ought, therefore, to have a chemical physiology, by which to study the cerebral localization thus given. But with this, the problems of physiological psychology, according to De Sarlo, come to an end. As a result we stand merely in the court of the temple. Whoever wishes to know the human mind must consider physiological psychology as an introduction to it. It requires special study of certain parts of physiology (physiology of the nervous system, sense organs and their connections) and it makes use of such methods only as are used in the physiological laboratory. From what has been said, the importance of the mode of envisaging psychology, according to De Sarlo, is evident. Physiological psychology does not investigate mental facts; it studies merely the concomitants and antecedents of the physical facts relatively to the mental phenomena. At the same time, De Sarlo does not make a distinction between psychology, properly called, and physiological psychology, in the sense that to the former alone belongs the interpretation of conscious experience and to the latter the derivation of the same experience from physiological processes. De Sarlo rejects such distinctions as inconsistent. There is only one method of causal psychologi-

cal explanation, and that consists in a derivation of the more complex mental processes from the more simple processes. Understood in this way, the physiological elements can always come in, by virtue of the above mentioned relation between natural experience and psychological experience, but they are always subsidiary. Materialistic psychology, in denying the existence of psychical causality, has, in place of the task set by De Sarlo, the other task of deriving psychical processes from the physiology of the brain, thus occupying a position which, as was said, is indefensible both theoretically and psychologically.

The problems of experimental psychology, according to De Sarlo, are the following. 1. To study the formation of complex perceptions, by analyzing the images and sensations that compose them; and by showing how the elements go together. 2. To investigate the time required for certain mental facts and to show how they are related to the rest of consciousness (psychometry). 3. To determine the changes of mental phenomena in relation to stimuli; also to determine the dependence of intensity of mental facts upon the intensity of stimuli (psychophysics). In all of these researches, the laboratory of experimental psychology, such as was recently established in the Institute of Higher Studies of Florence, will be indispensable. De Sarlo, who was heart and soul the sponsor of this modern foundation, has gathered about him a good number of younger students[1] who, while pursuing various interests in philosophy, under the guidance of their teacher, enable Italy to make its contribution to the progress of experimental psychology.

We congratulate them sincerely upon this opportunity: because if there is, indeed, a line of division between the old psychology and the new, represented by the work of the German philosopher and psychologist, Herbart; if the founders of modern psychology were Weber, Fechner, Lotze, Helmholtz and Wundt; and if, from 1879 to the present, laboratories of psychology have spread and multiplied in Germany, England, France and America; Italy cannot and must not lag too far behind the other nations. In the historical development of the various

[1] De Sarlo has held a course of lectures on auditory sensations, supplementing the instruction by experiments. The results of the researches, undertaken in the laboratory, will be published in the appropriate journals. The titles are: *Automatic Movements and Mind-reading; Memory; The Perception of Time; Emotive Antagonism; Optical Illusions; Involuntary Movements in Connection with Pleasant and Unpleasant Sensations; Elementary Æsthetic Feelings; Affective Memory; A Study of Dreams; Attention and Physiological Phenomena.*

methods of scientific investigation, and especially of the experimental method, Italy too, has, glorious traditions!

Physiological psychology and experimental psychology may be considered, says De Sarlo, as two chapters of empirical psychology. In fact, in a general sense, empirical psychology embraces the study of the whole of mind, without the limitations of the two sciences just mentioned. But it has well marked characteristics which distinguish it from rational or speculative psychology. Rational psychology attempts to deduce the whole of mental life from determinate principles. Empirical psychology arises out of the need for a science of mind, the facts of which shall be arrived at, not deductively, but by means of introspection. Empirical psychology, thus, has the task, especially, of analyzing mental facts, of describing and making clear their composition and relations, by means of internal observation or introspection, and by taking account of suggestions that come from other sciences, as from psychiatry, which, dealing as it does with the complex phenomena in their disaggregation, presents an analysis naturally produced. Psychological explanation, says De Sarlo, is not identical with the explanation of natural science. Empirical psychology can establish connections between mental phenomena without knowing the ground for the connection: we can have psychological laws in the sense that we are able to follow out empirical co-existences and sequences in the qualitative states; but we are not able to study the formation of these states.

A necessary complement to empirical psychology is a metaphysics of mind, in the same way as there is a metaphysics of nature. Introspection reveals to us merely a succession of qualities; but when we wish to trace out the mechanism by which mental evolution is accomplished, we must refer to the purposes which consciousness reunites. The two edifices which the human consciousness must construct are knowledge and morality. We may say, therefore, that mental development is possible, in so far as it is directed toward the attainment of these two high ends. The metaphysics of mind cannot treat the human consciousness merely as one thing among other things, but rather as a microcosm; because, in exercising the two functions of knowledge and morality, it reflects in itself the whole universe. Considered from this standpoint, the science of mind is essentially philosophical.